

## **Wisconsin Statewide Waste Characterization Study Summary 2002**

In 2002, the Wisconsin Department of Natural Resources contracted with Cascadia Consulting Group to conduct the first statewide waste composition study at 14 Wisconsin municipal solid waste landfills<sup>1</sup>. During the last six months of 2002, Cascadia physically sorted over 400 samples of in-state generated waste delivered to these landfills into 64 discrete categories in order to find out what kind of wastes are being landfilled in Wisconsin. The results of the study provide the best profile to date of the actual waste disposal practices of Wisconsin residents and businesses.

Together with complementary data from previous surveys and studies, the Cascadia study indicates that:

- wood waste (12.8%), food waste (10.2%), and “non-banned” compostable paper (9%) constitute the largest categories of waste going to our landfills;
- construction and demolition activities contribute about 30% of the waste going to landfills;
- plastic film and other miscellaneous “non-banned” plastic products make up 7.7% of the waste going to our landfills. This includes agricultural bags, consumer packaging and shopping bags.
- the landfill material bans, instituted in the 1990s to bolster recycling, have successfully reduced disposal of recyclables in landfills;
- new approaches to certain materials may be needed to further reduce the volume of recyclable material that is lost to landfilling.

### ***Waste Sort Methodology***

Wisconsin has approximately 36 active municipal solid waste landfills; industrial waste landfills, for wastes such as paper mill sludge and coal ash, were not included in this study. The 14 landfills chosen for this study represent a cross-section of Wisconsin landfills, both in terms of their geographic distribution around the state and in the mix of urban, suburban, rural, commercial, residential and construction/demolition waste that they accept. The 14 landfills are among the largest in the state, and together represented about 78 percent of all the in-state generated municipal solid waste disposed of in Wisconsin.

At each landfill, the Cascadia samplers randomly selected vehicles entering the landfill. The selected vehicles were sent to the sort crew where the field supervisor verified information about the load. The load was then tipped and samples weighing 200 to 300 pounds were randomly selected. The waste in the samples was physically sorted into the 64 material categories. Material weights and other information were recorded on the field forms. This information was then used to determine the composition of in-state waste in Wisconsin’s landfills.

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<sup>1</sup> The study was funded by \$150,000 appropriated from the segregated recycling fund in the 2001 state budget. A complete copy of the report is available in pdf format on the DNR Waste program publication website <http://www.dnr.state.wi.us/org/aw/wm/publications>.

## Results of the Waste Sort

Table 1 presents the estimated weights and percentages for landfilled waste in Wisconsin in 2002. For each of the categories, the annual tonnage estimate is accompanied by a mean percent (highlighted in gray) and a range of percents that represents the 90 percent statistical confidence interval (i.e., there is a 90% chance that the actual percent falls between the high and the low ends of the range).

**Table 1 – MSW Landfill Composition Profile for Wisconsin<sup>2</sup>**

*Calculated at a 90% confidence level*

	Tons	Mean	Conf. Interval			Tons	Mean	Conf. Interval	
			Low	High				Low	High
<b>Paper</b>	<b>987,646</b>	<b>20.8%</b>			<b>C&amp;D</b>	<b>1,364,053</b>	<b>28.7%</b>		
Newsprint	92,270	1.9%	1.7%	2.2%	Wood - treated	44,459	0.9%	0.4%	1.4%
High Grade Paper	65,585	1.4%	1.1%	1.7%	Wood - untreated	607,650	12.8%	10.7%	14.9%
Magazines/Catalogs	47,381	1.0%	0.8%	1.1%	Rock/Concrete/Brick	165,727	3.5%	2.2%	4.8%
Cardboard - recyclable	188,176	4.0%	3.0%	4.9%	Drywall	80,164	1.7%	1.1%	2.2%
Cardboard - coated	11,123	0.2%	0.1%	0.4%	Roofing Shingles	284,752	6.0%	4.0%	8.0%
Boxboard	34,835	0.7%	0.7%	0.8%	PVC	2,261	0.0%	0.0%	0.1%
Mixed Recyclable Paper	201,715	4.2%	3.9%	4.6%	Ceramics/Porcelain	15,640	0.3%	0.2%	0.5%
Compostable Paper	228,310	4.8%	4.3%	5.3%	Other C&D	163,399	3.4%	2.1%	4.7%
R/C Paper	118,250	2.5%	1.8%	3.2%	<b>Problem Wastes</b>	<b>367,230</b>	<b>7.7%</b>		
<b>Plastics</b>	<b>499,313</b>	<b>10.5%</b>			Televisions	23,915	0.5%	0.2%	0.8%
PET Bottles	19,610	0.4%	0.4%	0.5%	Computer Monitors	10,052	0.2%	0.0%	0.4%
HDPE Bottles - natural	8,382	0.2%	0.1%	0.2%	Computer Equipment	2,779	0.1%	0.0%	0.1%
HDPE Bottles - colored	10,373	0.2%	0.2%	0.3%	Electronic Equipment	64,472	1.4%	1.0%	1.7%
#3-#7 Other Plastic Bottles	809	0.0%	0.0%	0.0%	White Goods - refrigerated	13,816	0.3%	0.0%	0.5%
Polystyrene	22,435	0.5%	0.4%	0.5%	White Goods - non-refrigerated	12,132	0.3%	0.0%	0.5%
Other Rigid Plastic Containers	74,119	1.6%	1.1%	2.0%	Lead-Acid Batteries	6,985	0.1%	0.0%	0.3%
Plastic Film	188,990	4.0%	3.6%	4.4%	Other Household Batteries	2,832	0.1%	0.0%	0.1%
R/C Plastic	174,597	3.7%	2.9%	4.4%	Tires	27,701	0.6%	0.2%	1.0%
<b>Metal</b>	<b>299,245</b>	<b>6.3%</b>			Bulky Items	124,612	2.6%	1.8%	3.4%
Aluminum Cans	16,291	0.3%	0.3%	0.4%	Fluorescent Lights	242	0.0%	0.0%	0.0%
Other Aluminum	15,025	0.3%	0.2%	0.4%	Ballasts	767	0.0%	0.0%	0.0%
Tin Cans	25,715	0.5%	0.4%	0.6%	Pallets	76,926	1.6%	1.0%	2.3%
Ferrous Metals	171,086	3.6%	2.6%	4.6%	<b>Household Hazardous</b>	<b>26,155</b>	<b>0.6%</b>		
Non-Ferrous Metals	5,965	0.1%	0.1%	0.2%	Latex Paint	6,988	0.1%	0.0%	0.3%
R/C Metal	65,163	1.4%	0.9%	1.8%	Oil Paint	1,095	0.0%	0.0%	0.0%
<b>Glass</b>	<b>107,862</b>	<b>2.3%</b>			Pesticides/Fertilizers	0	0.0%	0.0%	0.0%
Glass - recyclable	42,721	0.9%	0.8%	1.0%	Auto Used Oil Filters	1,874	0.0%	0.0%	0.1%
R/C Glass	65,141	1.4%	0.6%	2.2%	Mercury	6	0.0%	0.0%	0.0%
<b>Organics</b>	<b>853,914</b>	<b>18.0%</b>			Other Hazardous	16,191	0.3%	0.0%	0.7%
Yard Waste - <6"	56,562	1.2%	0.8%	1.6%	<b>Other Wastes</b>	<b>246,800</b>	<b>5.2%</b>		
Yard Waste - >6"	5,359	0.1%	0.0%	0.2%	Textiles	115,867	2.4%	1.9%	3.0%
Food	486,619	10.2%	9.0%	11.4%	Carpet	116,160	2.4%	1.4%	3.5%
Diapers	85,006	1.8%	1.5%	2.1%	Carpet Padding	14,773	0.3%	0.2%	0.5%
Animal Waste/Kitty Litter	45,260	1.0%	0.7%	1.2%					
Bottom Fines/Dirt	79,296	1.7%	1.4%	1.9%					
R/C Organic	95,812	2.0%	1.5%	2.5%					
<b>Total Tons</b>	<b>4,752,218</b>								
<b>Sample Count</b>	<b>400</b>								

<sup>2</sup> Source: Cascadia Consulting Group, Table 3-3

Table 2 presents the top 10 waste types (by weight) as determined in the study. Collectively, these waste types--predominantly construction and demolition debris, paper and food--make up more than half of the waste disposed of in the state's municipal solid waste landfills. Construction and demolition debris includes dense materials such as shingles and brick, increasing its prominence in a study based on material weight. Plastic film (primarily trash bags, grocery bags and plastic wrap), which is much less dense than most other wastes when landfilled, still accounted for 4 percent of all waste landfilled and is more noticeable in visual terms at landfills. Recyclable cardboard is the only of the "banned" items to appear among the top ten waste types. Despite its appearance in this category, it's recycling rate is calculated at 70% of generation<sup>3</sup>.

**Table 2 – Top 10 Wastes Types**

<b>Waste Category</b>	<b>Tons in Landfill</b>	<b>% of Landfill</b>
Untreated wood	607,650 tons	12.8%
Food waste	486,619 tons	10.2%
Roofing shingles	284,752 tons	6.0%
Compostable paper	228,310 tons	4.8%
Mixed Recyclable paper	201,715 tons	4.2%
Plastic Film	188,990 tons	4.0%
Recyclable cardboard	188,176 tons	4.0%
RC plastic	174,597 tons	3.7%
Ferrous metals	171,086 tons	3.6%
Rock/concrete/brick	165,727 tons	3.5%

### ***Landfill Banned Items***

One of the key objectives of the 2002 Waste Composition Study was to determine whether Wisconsin's statutory bans on landfilling of various materials have been effective in keeping the bulk of these wastes out of landfills. It is important to note that, except for major appliances, lead-acid batteries, waste oil and yard waste, Wisconsin's landfill bans are not absolute. The bans allow for landfilling of certain recyclable banned materials if they are generated in a municipality with an effective recycling program but have not been separated out for recycling. The bans rely on local municipalities to enforce recycling of the banned materials, but realistically allow for less than 100 percent compliance by residents and businesses in those municipalities.

Table 3 presents the amount, by weight, of banned materials going to Wisconsin landfills as determined in the study. Recycling rates for these materials are discussed in the DNR companion publication "Status of Recycling Report" produced in July 2003.<sup>4</sup> The bans appear to be less successful in reducing the landfilling of plastic containers and aluminum cans than for the other banned materials. Landfilling of these materials likely reflects the rapidly growing prevalence of single-serve beverage consumption away from home, where recycling opportunities are much more limited.

<sup>3</sup> See "Status of Recycling Report" available in pdf format on the DNR Waste program publication website <http://www.dnr.state.wi.us/org/aw/wm/publications>.

<sup>4</sup> This report is available in pdf format on the DNR Waste program publication website <http://www.dnr.state.wi.us/org/aw/wm/publications>.

**Table 3 - Landfilling of Banned Materials**

<b>Waste Category</b>	<b>Tons in landfill</b>	<b>% of Landfill</b>
<b>1991 Ban</b>		
Lead acid batteries <sup>1</sup>	6,985 tons	Not calculated
Major appliances <sup>1,2,3</sup>	25,948 tons	Not calculated
<b>1993 Ban</b>		
Yard waste	56,562 tons	1.2 %
<b>1995 Ban</b>		
Aluminum & steel containers	42,006 tons	0.8 %
Corrugated paper	188,176 tons	4.0 %
Plastic containers	38,365 tons	0.8 %
Glass	42,721 tons	0.9 %
Magazines	47,381 tons	1.0 %
Office paper	65,585 tons	1.4 %
Newspaper	92,270 tons	1.9 %
Waste tires <sup>1,3</sup>	27,701 tons	Not calculated

<sup>1</sup> Absolute ban

<sup>2</sup> Microwave ovens can be landfilled if capacitors are removed

<sup>3</sup> Cascadia landfilling estimates are considered high -- landfill operators remove observed tires and appliances prior to burial. Landfill inspection reports indicate that these materials effectively have been eliminated from the landfill waste stream. In addition, a large amount of waste tires are incinerated.

## **Conclusions**

The 2002 Waste Composition Study provides valuable information for assessing the performance of the state's existing waste management and recycling programs and for identifying opportunities for the future. Overall, the study indicates that Wisconsinites are doing a good job complying with existing landfill bans and minimizing most easily recyclable waste that goes to landfills. Particular bright spots include the diversion of significant amounts of yard waste, household hazardous waste, newspaper, and cardboard. These data, combined with results of the most recent telephone survey of Wisconsin residents' household recycling practices<sup>5</sup>, indicate strong and continuing acceptance of recycling as a way of life in Wisconsin. The waste sort identified new materials which are found in sufficient quantity to offer significant opportunities for increased diversion. Construction and demolition debris (~30% of material landfilled) and

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<sup>5</sup> The June, 2002 University of Wisconsin Survey Center's "Wisconsin Household Trash Disposal and Recycling, 1990-2002" survey commissioned by DNR indicated 94% of households recycle at least some portion of their trash, and 67% of residents "strongly committed" to recycling.

organics (food waste and several paper categories) appear to have the most potential. The studies reaffirm our success and identify the areas where we need to improve; they will help DNR and stakeholders address the future direction of the recycling program.